

The rearing of *Cheilosia paganus* and *C. fraterna* (Diptera: Syrphidae)

By ALAN E. STUBBS *

Cheilosia is the largest genus of British hoverflies with 33 species on the British list plus additional species yet to be published. One of the major outstanding biological problems with our hoverfly fauna is to determine the breeding sites for the species in this very diverse genus. One species, *C. scutellata* Fallen has been reared from fungi (especially *Botelus*) but the various studies involving the rearing of Diptera from fungi would have revealed a wider range of *Cheilosia* species had this been the main larval food for the genus. Various other species have been reared from flowering plants and such an ecological relationship could in theory provide plenty of scope for the evolution of species diversity. The few known plant associations are mainly inconspicuous occurrences in roots, so solution to the problem amounts to a needle in a haystack search of at least the more robust herbaceous plants in the British flora.

My own revisionary studies on the taxonomy of the adults had led me to an interest in a possible larval relationship with some of the plants whose flowers attract the adult hoverflies. The timing of the present discoveries results from the annual meeting of dipterists on 23rd September 1978 when a discussion on the biology of hoverflies led Dr. Martin Speight to lay strong emphasis on the need for more vigilant efforts in tracing larval foodplants from adult flower associations. The matter may not be straight forward since, for instance, some species which breed in thistle roots are adult in early spring long before the flowers are out and some *Cheilosia* visit a wide range of flowers. However, thus enthused, two of my autumn forays revealed larvae of species whose breeding site was previously unknown.

Cheilosia paganus (Meigen)

On 1st October 1978 a walk on Horsendon Hill, Middlesex, took me past a stand of cow parsley (*Anthriscus sylvestris* L. Hoffm.), long dead but reviving memories of the lure that umbelliferous flowers have for *Cheilosia* and other hoverflies. The known associations are with thistles, figwort and *Primula*, the prospects with umbells not being good because I have frequently inspected (in the spring) the roots of angelica (*Angelica*), wild parsnip (*Pastinaca*) and hogweed (*Heracleum*) for other dipterous larvae without having seen any *Cheilosia*.

The plants were in partial shade at the edge of hawthorn bushes. Pulling up the dead stems proved quite successful (hopefully it not illegal to uproot dead plants!). Many of the stems came up intact but these mostly seemed to be lacking in any damage or rot. A few broke off at ground level and these were generally the rotten ones. By gently easing such stems out of the ground, the largest tap roots were found to be in a wet and gungey state of decay. Within this gunge were

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rather inconspicuous dumpy white larvae about 1 cm long which were immediately recognisable as being Syrphidae since they had a short 'tail' consisting of projecting fused hind spiracles. It was almost certain that these larvae belonged to the genus *Cheilosia*.

One larva was preserved in alcohol and another four were used for rearing. The main problem with so few larvae was to devise a suitable rearing technique. It should be noted that the larvae always occurred as singletons so an artificial gregarious existence may have been unsuitable. Adapting my technique for rearing from dead wood, a plastic seed propagator was used. Inside this, two larvae were placed in their tap roots within a polythene bag which was not sealed but allowed access for a small amount of air so that fungi might hopefully not invade. For the other two larvae, a 3½ inch flowerpot was filled with a mixture of moist peat and clay soil and a tap root and a piece of gunge, each with a larva placed within this medium. The propagator was kept over winter in a garage.

It was expected that the larvae would pupate *in situ* but by spring it was found that the larvae had vacated the polythene bag. An adult female *C. paganus* was seen within the propagator on 12th April 1979 and it was soon realised that another female and two males were dead within, but had not been seen since they had crawled underneath the flowerpot and a bottom lining of newspaper. Search of the flowerpot revealed one empty puparium at the top of the now dried up tap root and another within the soil. Since no puparia could be found elsewhere in the propagator, it seems that the larvae from the polythene bag could have got into the flowerpot through holes in the base, though the full complement of puparia could not be accounted for.

***Cheilosia fraterna* (Meigen)**

The Diptera Recording Schemes field meeting based at Newbridge-on-Wye, Powys, included a visit on 8th October 1978 to a Breconshire Naturalists Trust reserve just over a mile north of the village. On the flanks of a sallow covered fen there was a sizeable area of rough grassland with abundant marsh thistle (*Cirsium palustre* (L.) Scop.). The summer growth had largely died back but the opportunity seemed right for finding larvae or puparia of the early spring hoverflies *Cheilosia albipila* Meigen and *C. grossa* (Fallen) which have been recorded from the roots of thistles. A larva was found in the first minute simply by turning the stems down so that the base of the stem was seen just below ground. The larva was a conspicuous dull white against the dark soil and its position corresponded with a hole in the stem about 5 mm round scarcely below the soil surface. The hole gave access to a rather wet gungey decay material within the base of the stem. At least 20 minutes was spent turning back 50 or more further stems, and uprooting a few, but no more larvae could be found.

The larva was placed in a glass tube with a little moist soil and the stem and a larger amount of soil put in a polythene bag. On reaching home later that day the stem was replanted in a 3 inch square plastic flowerpot and the larva rehabilitated as naturally as possible. The pot was placed in a polythene bag with the mouth constricted but not sealed and then placed within a seed propagator. The idea of the polythene bag was to prevent the soil drying out and indeed this was very successful compared with the *C. paganus* pot without a polythene bag.

It was frustrating that the expected early *Cheilosia* had not emerged in the relative warmth of the garage by early April. On turning the root back, there was a whitish puparium by the hole in the root just below the soil surface. As time went by it was increasingly clear that another species was involved. On 12th April the puparium had become dark and on the morning of the 14th a freshly emerged female *C. fraterna* was seen on the inside of the polythene bag.

Comment

These few observations require following up before such associations can be regarded as typical for the species concerned. One aspect which needs clarification is whether or not the presence of the fly larva causes the state of rot described or whether the larvae can only succeed in stems already damaged with rot. If umbelliferous plants are normally utilised by *C. paganus*, then one may note that in addition to cow parsley, the adults also frequent hedge-parsley (*Torilis*), and burnet saxifrage (*Pimpinella saxifraga* L.) which have relatively solid stems in the autumn because the flowers are late, a useful state of decay in at least *Torilis* not occurring until spring. Since *C. paganus* is out from spring till autumn, it remains a matter of conjecture as to whether eggs are laid on live stems or decaying ones. *C. fraterna* is a spring species so must (as with *C. albipila* and *C. grossa*) lay its eggs on new thistle stems, though this may not be the normal foodplant. It seems probable that some species use several host plants — for instance *C. variabilis* (Panzer) (on figwort, *Scrophularia*) and *C. antiqua* Meigen (on *Primula*) occur commonly where their recorded foodplants are absent. *C. semifasciata* Becker occurs in both roseroot (*Sedum telephium* L.) and wall pennywort (*Umbilicus*). One of the leads for further larval discoveries may be the very close association of adult *C. albitarsis* with buttercup flowers, *Ranunculus*. Also one may note that with the related hoverfly *Portevinia maculata* (Fallen), whose adults are so common on ransoms (*Allium ursinum* L.), no British worker seems to have clarified the exact nature of the larval breeding site so we are relying on vague old published statements from the continent.

Apart from the interest in discovering the larval biology of the *Cheilosia* species, there is an urgent need for bred series in order to unravel some of the outstanding taxonomic problems with the adults. For instance there is still an element of

doubt as to whether *C. paganus* is one species or two since some field samples include a surprising range in variation of antennal and other characters. We are presumably a long way from breeding through from the eggs of a captive female, but at least series bred from known situations would be a step in the right direction. Also further information on plant associations may aid a better understanding of the evolutionary relationship between *Cheilosia* species.

The puparia of *C. paganus* and *C. fraterna* have seemingly good taxonomic characters, most obviously on the anterior and posterior spiracles, but also in the anal area and in the extent of development of posterior lobes. No attempt is made here to describe puparia since this is best done in comparison with all available species. John Haslett has begun work at Oxford University which may lead to a more comprehensive review. Hopefully readers of this account will include lepidopterists, coleopterists and others who more frequently search in plants and among roots than do dipterists. It is quite likely that all potential host plants for *Cheilosia* have been searched by non-dipterists and 'useless' dipterous maggots discarded. So please look out for somewhat robust larvae with a short 'tail', or dumpy puparia with a short 'tail' and two short anterior horns. It ought to be possible to discover the plant associations of at least our common *Cheilosia* and this might give a better lead into determining the host plants of the rare species.

References

- Coe, R. L., 1953. Diptera Syrphidae, *Handbook Ident. Br. Insects.*, 10 (1).
 Uffen, R., and Chandler, P., 1978. Higher Plants. In *A Dipterist's Handbook. Amateur Entomologist*, 15: 213-228.

ON BEING "STARED AND GRINNED AT BY THE VULGAR". — Dr. R. S. Wilkinson's delightful note (*Ent. Rec.*, 91: 289-293) on embarrassing entomological incidents reminds me of two such events which might have turned out less happily.

One of my more unusual data labels records the capture of the medium sized moth *Persectania aversa* Walk. (roughly the size of *Agrotis segetum* D. & S., the Turnip moth) caught at 35,000 feet. We were between Sydney and Perth when the insect flew out of the air hostess' blouse as she bent to serve my neighbour with a Scotch. Having as usual a handy pill box I captured it as it sat on the arm of the seat without attracting the attention of the other passengers, but to the admiration of the hostess.

A useful spot for captures in New York used to be (and, maybe, still is) a brilliantly lit hot dog stand on the corner of 6th Avenue and 42nd Street. When passing one evening en route to my hotel, I saw what seemed to be an interesting Geometrid poised on a customer's plate. It was successfully boxed while his head was turned to speak to his neighbour. Unhappily on investigation the moth was found to be heavily contaminated by mustard which may have hindered its ability to fly. J. A. C. GREENWOOD, Hambleton House, Rogate, West Sussex GU33 5EE.